

Appl. No. 10/252,314  
Amdt. dated May 30, 2007  
Reply to Office Action of Jan. 3, 2007

REMARKS

In view of both the amendments presented above and the following discussion, the Applicants submit that the claims now pending in the application are patentable under the provisions of 35 U.S.C. §§ 101, 102, 103 and 112. Thus, the Applicants believe that all of these claims are now in allowable form.

If the Examiner believes that there are any unresolved issues in any of the claims now pending in the application, the Examiner is urged to telephone Mr. Richard J. McGrath, Esq. at 703-621-7140 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

The Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-22 are pending in the present application and claims. This Amendment cancels claims 11, 12 and 22, amends claims 1 and 20 to include the limitations of claim 11 and 12 and amends claims 13 and 14 to depend from claim 1 and claim 21 to depend from claim 20. New claims 23-24 have been added. The Examiner is respectfully requested to reconsider the rejection of the claims in view of the amendments to the claims and the remarks as set forth below.

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Rejection of Claims 13 and 22 Under 35 U.S.C. § 112

The Examiner rejected claims 13 and 22 under the provisions of 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 13 has been amended to delete the objectionable "such as" phrase, and claim 22 has been canceled. Accordingly, the Examiner is respectfully requested to withdraw the rejection based upon 35 U.S.C. § 112.

Objection to Claims 21 and 22

The Examiner objected to claims 21 and 22 as failing to further limit the claims. Claim 21 has been amended to depend from claim 20 and claim 22 has been canceled. Accordingly, the Examiner is respectfully requested to withdraw the objection to claims 21 and 22.

Rejection of Claims 1-3, 11, 16-18, 21 and 22 Under 35 U.S.C. § 102(b)

The Examiner rejected claims 1-3, 11, 16-18, 21 and 22 under the provisions of 35 U.S.C. § 102(b), as being anticipated by U.S. Patent 6,575,564, Tsuchiya et al. (hereinafter "Tsuchiya"). Since independent claims 1 and 20 have been amended to include the limitations of claims 11 and 12, the rejection of claims 1-3, 11, 16-18, 21 and 22 under the provisions of 35 U.S.C. § 102(b) claim 19 is now moot. Amended independent claims 1 and 20 have been amended and now include the limitations of original dependent claims 11 and 12.

Rejection of Claims 6-10, 13 and 20 Under 35 U.S.C.  
§ 103(a)

The Examiner rejected claims 6-10, 13 and 20 under the provisions of 35 U.S.C. § 103(a), as being unpatentable over Tsuchiya. Since claim 13 has been canceled and since claims 6-10 and 20 have been amended to include the limitations of claims 11 and 12, the rejection of claims 6-10, 13 and 20 under the provisions of 35 U.S.C. § 102(b) is now moot.

Rejection of Claims 12 and 14 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 12 and 14 under the provisions of 35 U.S.C. § 103(a), as being unpatentable over Tsuchiya in view of U.S. Patent 6,874,870, Ishikawa et al (hereinafter "Ishikawa"). The Applicants believe that amended claim 1 which includes the limitation of original claims 11 and 12 is patentable over Tsuchiya in view of Ishikawa.

The Applicant believes that Tsuchiya may be related to printing of viscous materials, but Tsuchiya does not consider the possibility of using viscosities with an applied pressure in a range described and claimed in the present application. In effect, the pressures disclosed in Tsuchiya are an order of magnitude smaller than the ranges disclosed in the present application. More specifically, Tsuchiya discloses in column 10 a moderate pressure of 0.3 bar. However, in the range of 15-600 bar as recited in

claim 6, "ordinary" printing techniques fail to provide adequate droplet forming.

Indeed, if the skilled person had considered applying a pressure in the range as described in the present patent application, the skilled person would consult and find that Ishikawa teaches a predetermined region of distances of the piezoelectric member to the nozzle of about 2-5mm. However, the inventor has found that this region is an order of magnitude too high for providing a suitable and useful droplet function. Only the present application teaches the advantages of providing a close distance in a range of 15-500 micrometer, which is indeed several orders of magnitude smaller than the suggested prior art range. It is respectfully submitted that the skilled person would not know a suitable working range, and that the cited prior art Ishikawa reference would lead the skilled person to a distance which is a wrong order of magnitude away from the correct distance.

In addition, Ishikawa is very specific in having a prescribed distance. In col. 2, lines 22-30, Ishikawa states:

"the ink tends to have high viscosity and low surface tension compared to the conventional water soluble ink due to the characteristic of light curable compound of the main component, and further the viscoelasticity of the ink is largely different from that of water soluble ink, therefore, it is difficult to eject the light curable ink stably by using the inkjet head used for the water soluble ink as it is. Especially,

in the case of ejecting small drops of ink, a stable printing will be hardly possible."

For such high viscous inks, Ishikawa describes a distance between the piezo electric member and the nozzle (see Fig 2, distance L), and Ishikawa prescribes 2-5 mm as being a workable distance. (See also col. 2, lines 51-52). However, it is respectfully submitted that this is a configuration wholly different from the claimed configuration including a movable control pin. Therefore, both the dimensions and arrangement of Ishikawa differ considerably from the claimed invention.

The Applicant believes that that even if a skilled person would consider using higher printing pressures when using higher viscosity printing fluids, no hint or indication is present in the cited prior art that the end of a control pin should be placed at a predetermined distance of 15-500 micrometer from the outflow opening, for varying the pressure adjacent the outflow opening by means of vibration of the control pin. The prior art is silent with respect to this claim feature which is recited in original claim 12 and which is now included in amended independent claims 1 and 20.

Indeed, for high viscous materials, there is so no teaching of Applicant's claimed pin position for providing an oscillating pressure. Only the inventors have discovered that the pin position is important, and in particular, that it should be positioned within the predetermined range mentioned in amended claims 1 and 20.

The Applicant respectfully submits that the Office Action fails to state a *prima facie* case of obviousness for amended claims 1 and 20, because the cited prior fails to disclose a movable control pin which moves in a longitudinal direction towards/away from the outflow opening, and wherein an end of the control pin can be placed at a predetermined distance of 15-500 µm from the outflow opening, for varying the pressure adjacent the outflow opening by means of vibration of the control pin. Accordingly, the Applicant respectfully submits that amended independent claims 1 and 20 are patentable over the cited prior art, and the Examiner is respectfully requested to withdraw the rejection of amended claims 1 and 20.

Dependent Claims 2-10, 13-19 and 21

It is respectfully submitted that dependent claims 2-10, 13-19 and 21 are allowable over the cited prior art for at least the same reasons as amended independent claims 1 and 20 from which they depend.

Allowable Subject Matter

The Applicant notes with appreciation that the Examiner has found claims 4, 5 and 15 to include allowable subject matter. Accordingly, claims 4 and 5 have been rewritten as new claims 23-24 and in independent form including all the limitations of the base claims and any intervening claims. Accordingly, claims 23 and 24 are in

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condition for allowance. Claim 15 is still in dependent form, and it still includes its original scope.

Conclusion

In view of the above amendments and remarks, it is believed that the claims clearly distinguish over the references relied on by the Examiner, either alone or in combination.

Respectfully submitted,

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CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)

I hereby certify that this correspondence is being deposited on **May 31, 2007** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

  
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